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<b>(21) International Application Number:</b> PCT/US99/25942 <b>(22) International Filing Date:</b> 3 November 1999 (03.11.99)  <b>(30) Priority Data:</b> 60/106,850 3 November 1998 (03.11.98) US  <b>(71) Applicant (for all designated States except US):</b> THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> HORTEL, Thomas, Charles [US/US]; 5371 Meyers Lane, Cincinnati, OH 45242 (US). CONRAD, Jonnie, Pehrson [US/US]; 587 Compton Road, Cincinnati, OH 45231 (US). SIKLOSI, Michael, Peter [US/US]; 7299 Bobby Lane, Cincinnati, OH 45243 (US).  <b>(74) Agents:</b> REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US).		<b>(81) Designated States:</b> AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
<b>(54) Title:</b> CARPET STAIN REMOVAL SYSTEM  <b>(57) Abstract</b>  A carpet stain removal product and process is disclosed. The product includes a liquid cleaning composition which contains water, an organic solvent and a surfactant, an absorbent stain receiver, and a hand-held tool for imparting mechanical agitation onto stains on carpets. The hand-held tool is, for example, a triangular implement, with three edges and three rounded corners. Two of these edges and two of these rounded corners are serrated while the remaining edge and rounded corner is smooth.		

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## CARPET STAIN REMOVAL SYSTEM

### FIELD OF THE INVENTION

The present invention relates to compositions, product kits and processes for removing stains or spots from carpet fibers using mechanical agitation.

### BACKGROUND OF THE INVENTION

Historically, home consumers have used vacuum cleaners and carpet steamers to freshen and clean carpeting. However, because they can only apply mechanical force and agitation, these devices are often ineffectual for cleaning stains and ground-in soils to loosen dirt and stain particles from carpet fibers.

To aid consumers in stain removal, special liquid cleaning compositions for carpets have been created which are particularly suited for stain and soiled-spot removal. Liquid cleaning compositions are typically composed of: surfactants, which provide deterative cleaning benefits; organic solvents, which attempt to loosen the bonds between stain particles and carpet fibers and also aid in cleaning; water and variety of other minor ingredients.

Generally, one applies these compositions upon the stained or soiled area of a carpet and spreads the composition onto the carpet fibers so that there is more extensive contact between the cleaning composition and the stained and soiled carpet fibers. Typically, the consumer prefers to provide greater direct contact and a more thorough distribution by mechanically agitating the composition with an implement into the carpet layer. Any number of implements may be used to provide this mechanical agitation, including brushes, paper towels and a human finger. The combination of the mechanical agitation and chemical action of certain components of the cleaning composition, particularly the surfactants and organic solvents, serves to physically dislodge and either dissolve soils or suspend them in solution, suspending them in solution and creating a localized agitating/flushing action at a micro-level.

Having thus "dissolved" the soil particles by suspending them in the cleaning composition, it is typically preferable to transport them away from the carpet and carpet fibers; otherwise upon the evaporation of the cleaning composition the soils will simply reattach themselves to the carpet fibers. Soils may be removed from the carpet fibers by vacuuming the treated carpet area. In the alternative, one may establish intimate contact between an absorbent stain receiving pad (e.g. a paper towel) and the saturated area and by capillary suction pull the liquid cleaning composition and suspended soils away from the fibers.

A variety of carpet cleaning compositions are presently commercially available, but most of these compositions suffer from a number of drawbacks. First, many of them leave

sticky, foamy residues on the treated area of carpet; this is not only aesthetically displeasing, but may attract additional soil contamination which is counterproductive to the cleaning effort. Many of these compositions also attack the dyes and colorants in carpets, thus picking up dyes along with soil particulates and leaving a discoloration on the area treated by the cleaning composition.

Moreover, since these compositions are usually sold alone, without other components such as agitating implements, they are at times not only ineffectual, but may also cause damage to the carpet fibers if a consumer uses excessive force to attempt to release the soil and stain particles from the carpet.

Given the foregoing, there is a continuing need to develop new carpet stain removal products. Ideally, such products should not rely on a single carpet cleaning component, but rather combine a liquid cleaning composition particularly effective for removing stain or soil particulates with a carpet cleaning tool to provide mechanical agitation to loosen the soil and stain particles without abrading or otherwise damaging the carpet fibers.

Accordingly it is a benefit of the present invention to provide a carpet stain removal kit which includes both a liquid cleaning composition especially effective at dissolving and suspending soil particulates along with an implement which is a specially-suited hand-held tool for imparting mechanical agitation onto stains on carpet fibers without resulting abrasion or other damage to the carpet.

It has been found in the present invention that when the liquid cleaning compositions of the present invention are used in combination with a presently disclosed hand-held cleaning tool according to the process described herein, then there is a resultant synergy which provides for a cleaning effectiveness that is greatly improved then when either component is used alone.

Optionally, these two components may be used in coordination with a super-absorbent FAM absorbent receiver pad to leverage FAM's unique absorbency and filtration properties.

### SUMMARY OF THE INVENTION

The present invention relates to compositions, product kits and processes for removing stains or spots from carpet fibers using mechanical agitation.

The invention includes a liquid cleaning composition which contains water, an organic solvent and a surfactant. Carpeting cleaning kits prepared according to the present invention include this liquid cleaning composition and the hand-held cleaning tool described herein. The product kits may also optionally include a FAM absorbent stain receiver, the details of which are described herein. The invention also provides a process for removing stains from carpeting.

This process involves the steps of applying an effective amount of a liquid cleaning composition to the stain, imparting mechanical energy to the treated stain with the hand-held cleaning tool, and contacting the stain with an absorbent stain receiver having an absorbent material while applying pressure so as to absorb the stain into the absorbent material of the absorbent stain receiver. Variations of the liquid cleaning composition and stain removal process are also described herein and contemplated by the invention.

All percentages, ratios and proportions herein are by weight, unless otherwise specified. All documents cited are, in relevant part, incorporated herein by reference.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a top plan view of the hand-held tool of Figure 3.

Figure 2 is an end elevational view of the hand-held tool showing the second straight edge 11.

Figure 3 is a front side elevational view of the hand-held tool 20.

Figure 4 is an end elevational view of the hand-held tool showing the first straight edge 5.

Figure 5 is a bottom plan view of the hand-held tool of Figure 3.

Figure 6 is a back side elevational view of the hand-held tool 20.

Figure 7 is a perspective view of a hand-held tool which is used in the present invention to impart mechanical agitation onto a stain.

Figure 8 is a perspective view of a hand-held tool which is used in the present invention to impart mechanical agitation onto a stain.

#### DETAILED DESCRIPTION OF THE INVENTION

In a preferred embodiment, the liquid cleaning composition includes water, an organic solvent and a surfactant. Preferred levels and specific components are detailed hereinafter. Preferred solvents include butoxy propoxy propanol ("BPP") and ethanol, and the preferred surfactant is selected from the group consisting of anionic surfactants, nonionic surfactants, cationic surfactants and mixtures thereof. The absorbent stain receiver includes an absorbent material which, in essence, lifts or sucks the loosened stain from the material after the liquid cleaning composition has been applied and subjected to mechanical agitation. The most preferred absorbent material is a Functional Absorbent Material ("FAM") in the form of a foam. Also, the absorbent material can be selected from the group consisting of comminuted wood pulp, creped cellulose wadding, hydrogel-forming polymer gelling agents, creped tissues, creped nonwovens containing fibers comprised of absorbent polymers, modified cross-linked cellulose fibers, capillary channel fibers, absorbent foams, thermally bonded airlaid materials, absorbent sponges, synthetic staple fibers, polymeric fibers, peat moss, and combinations thereof.

According to the invention, a hand-held tool is used to impart mechanical agitation onto the stain to loosen it from the carpet fibers. As shown in figures 3 and 6 the tool 20 is substantially triangular. It has a first straight edge 5, a second straight edge 11 and a third straight edge 17, a first rounded corner 2, a second rounded corner 8 and a third rounded corner 14. The first and second straight edges and the first and second rounded corners are serrated, being provided with numerous ridges that project outward from the tool.

The stain removal product preferably includes instructions for using the product which comprises the steps of: applying an effective amount of the liquid cleaning composition to the stain; imparting mechanical agitation to the stain using the hand-held tool; and contacting the absorbent stain receiver with the stain while applying pressure so as to absorb the stain into the absorbent material of the absorbent stain receiver.

It should be noted that the mechanical agitation can be provided either concurrently or consecutively with application of the liquid cleaning composition. The phrase "effective amount" means an amount of the composition sufficient to saturate the stain, and will typically include applying from about 0.5 ml to about 3 ml of the composition for a small stain (e.g., less than 1 cm in diameter). This amount can vary dramatically if the stained area is very large, for example, on a large area of carpeting in which case much more of the composition will be needed to saturate the stained area. It is preferable for the stain to be thoroughly saturated with the cleaning composition so that with the assistance of a hand-held tool, the stain and soil particles can be effectively suspended in the composition. In this way, the absorbent stain receiver can absorb all of the soils embodied in the stain via absorption of the cleaning composition.

As an alternative to using an absorbent stain receiver, a consumer may choose instead to vacuum over the stained area of the carpet. In some cases, for certain stains neither an absorbent stain receiver nor vacuum is necessary. For certain stains, such as grape juice stains, and for nearly all light stains neither the use of a vacuum cleaner nor an absorbent stain receiver is necessary. In the case of these stains, the liquid cleaning compositions and the hand-held tool provide for a broad dispersion of the stain particles while a bleach ingredient of the liquid cleaning composition physically bleaches the color bodies of the stain to a more neutral color.

In an especially preferred embodiment of the invention, the liquid cleaning composition includes: from about 0.1% to about 10% by weight of an organic solvent; from about 0% to about 7% by weight of hydrogen peroxide; from about 0.01 % to about 3%, more preferably from about 0.01 % to about 2 % by weight of a peroxide-stabilizing amount of a chelating agent; from about 0.05% to about 5 %, more preferably from about 0.1 % to about 4 %, most preferably

from about 0.15% to about 3.5 % by weight of a detergent surfactant; and the balance water and other optional ingredients. Other ingredients and levels may be used in accordance with the invention and are detailed hereinafter.

Hand-held tool – The present invention includes with it a specially-designed hand-held cleaning tool to impart mechanical agitation onto stain and soil particles to loosen them from the carpet fibers without abrading or otherwise damaging the carpet fibers. As shown in figures 3 and 6 the tool 20 is substantially triangular. It has a first straight edge 5, a second straight edge 11 and a third straight edge 17, a first rounded corner 2, a second rounded corner 8 and a third rounded corner 14. The first straight edge 5 and the second straight edge 11 and the first rounded corner 2 and the second rounded corner 8 are serrated, being provided with numerous ridges that project outward from the tool. Preferably the ridges on each straight edge are of roughly the same shape and size, and preferably these ridges are equidistant from each other. As shown in Figures 3 and 6 it is preferable that the ridges on the first edge are of a different shape and size than the ridge of the second edge, giving the consumer more choice and flexibility in how she or he uses the tool. As can be seen in Figures 2, 3, 4 and 6 the ridges on the first straight edge 5 are finer and more numerous than the ridges on the second straight edge 11. The third rounded corner 14 and the third edge 17 are smooth, not serrated.

When in use, a stain 25 on a portion of carpeting 30 has the cleaning composition applied to it and then is subjected to force pressed in the z direction against the stain using the hand-held cleaning tool 20. A consumer may choose to use any of the hand-held tool's edges (5, 11, 17) or any of the hand-held tool's rounded corners 2, 8, 14 to apply the force. By using the edges, as shown in Figure 7, a consumer agitates a larger area of the carpet. By using the rounded corners of the tool as shown in Figure 8, a consumer is able to effect a finer degree of controlled agitation within a smaller area of the carpet..

Liquid Cleaning Compositions - The user of the present product or process can be provided with various liquid cleaning compositions to use as spot or stain removers. One problem associated with known carpet pre-spotting compositions is their tendency to leave visible residues on carpet surfaces. Such residues are problematic and are preferably to be avoided herein since the invention does not involve conventional immersion or rinse steps. Accordingly, the liquid cleaning compositions herein should, most preferably, be substantially free of various polyacrylate-based emulsifiers, polymeric anti-static agents, inorganic builder salts and other residue-forming materials, except at low levels of about 0.1%-0.3%, and preferably 0%, of the final compositions. Stated otherwise the compositions herein should be

formulated so as to leave substantially no visible residue on materials being treated according to the practice of this invention.

Accordingly, in a preferred aspect of this invention there are provided cleaning compositions which are substantially free of materials which leave visible residues on the treated fabrics. This necessarily means that the preferred liquid compositions are formulated to contain the highest level of volatile materials possible, preferably water, preferably from about 85 % to about 97.7%, more preferably from about 90 % to about 97 %; a cleaning solvent such as BPP or ethanol at a low, but effective, level, typically from about 0.1% to about 10%, preferably from about 1 % to 8 %, more preferably from about 1.5 % to 4 %; and deterative surfactants at levels from about 0.05 % to about 3.5 %, preferably from about 0.5 % to about 3.0 %, more preferably from about 0.8 % to about 2.0 %. Advantageously, when thus formulated such compositions exist as aqueous solutions rather than as suspensions or emulsions. Thus, such compositions do not require use of additional emulsifiers, thickening agents, suspending agents, and the like, all of which can contribute to the formation of undesirable visible residues on the carpet.

Indeed, as an overall proposition, any of the chemical compositions which are used to provide the pre-spotting function herein comprise ingredients which are safe and effective for their intended use, and, as noted above, preferably do not leave unacceptable amounts of visible residues on carpeting. While conventional laundry detergents are typically formulated to provide good cleaning on cotton and cotton/polyester blend fabrics, the compositions herein must be formulated to also safely and effectively clean and refresh carpeting. In addition, the compositions herein comprise ingredients which are specially selected and formulated to minimize dye removal or migration from the stain site of fugitive, unfixed dye from the carpets being cleaned.

In addition to the foregoing considerations, the compositions used herein are preferably formulated such that they are easily dispensed and not so adhesive in nature that they render dispensing from the container to be unhandy or difficult. However, and while not intending to be limiting of the present invention, the preferred compositions disclosed herein afford a spot-cleaning process which is both effective and aesthetically pleasing when used in the manner disclosed herein. Compositions prepared according to the present invention may contain some or all of the following active components.

- (a) Bleach - The compositions herein may optionally comprise from about 0.25% to about 7%, by weight, of hydrogen peroxide. Preferred spot cleaners will comprise 0.5 to about 3% hydrogen peroxide. It will be appreciated that peroxide sources other than  $H_2O_2$  can be used herein. Thus, various per-acids,



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per-salts, per-bleaches and the like known from the detergency art can be used. However, such materials are expensive, difficult to formulate in liquid products, can leave residues on fabrics and offer no special advantages over  $H_2O_2$  when used in the present manner.

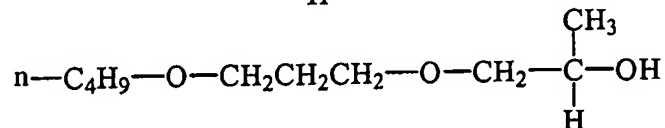
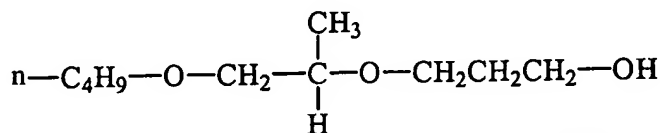
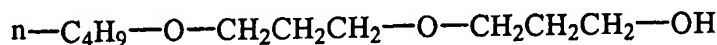
- (b) Solvent - The compositions herein may optionally comprise from about 0.01 % to about 10%, by weight, of butoxy propoxy propanol (BPP) solvent, ethanol or other solvents as disclosed herein. Preferred compositions will comprise 1-8% BPP or ethanol.
- (c) Water -The preferred, low residue compositions herein may comprise preferably from about 85 % to about 97.7%, more preferably from about 90 % to about 97 %, by weight, of water.
- (d) Surfactant - The compositions herein may optionally comprise from about 0.05% to about 3.5 %, by weight, of surfactants, such as amide carboxylates, MgAES and  $NH_4$ AES, amine oxides, ethoxylated alcohols or alkyl phenols, alkyl sulfates, and mixtures thereof. may also be used herein. Typically, the weight ratio of solvent:surfactant(s) is in the range of from about 10:1 to about 1:1. Other preferred compositions include 2% BPP/0.25% Neodol 23 6.5, 2% BPP/0.3% MgAE(1)S/0.035%  $C_{12}$  dimethyl amine oxide, 3 % ethanol/3 % Sodium N-Lauryl sarcosinate and 4% BPP/0.4% AS.
- (e) Dye Transfer Inhibiting Agents—The compositions of the present invention may also include one or more materials effective for inhibiting the transfer of dyes from one fabric to another during the cleaning process. Generally, such dye transfer inhibiting agents include polyvinyl pyrrolidone polymers, polyamine N-oxide polymers, copolymers of N-vinylpyrrolidone and N-vinylimidazole, manganese phthalocyanine, peroxidases, and mixtures thereof. If used, these agents typically comprise from about 0.01% to about 10%, preferably from about 0.01% to about 5%, and more preferably from about 0.05% to about 2%, by weight of the composition.
- (f) Chelator -Compositions which contain  $H_2O_2$  will also typically (although not necessarily) contain a chelating agent. The chelating agent is selected from those which, themselves, are stable in aqueous  $H_2O_2$  and which stabilize the  $H_2O_2$  by chelating vagrant metal ions. Such chelating agents are typically already present at low, peroxide-stabilizing amounts (0.01-1%) in commercial

sources of hydrogen peroxide. A variety of phosphonate chelators are known in stabilizing  $H_2O_2$ . The amino phosphonates are especially useful for this purpose. Various amino phosphonates are available as under the DEQUEST® trade name from the Monsanto Company, St. Louis, Missouri. Representative, but non-limiting, examples include ethylenediamine tetrakis (methylene phosphonic) acid, diethylenetriamine penta(methylene phosphonic) acid, and the water-soluble salts thereof. Amino tris(methylene phosphonic) acid or its water-soluble salts (as DEQUEST 2000®) is a preferred chelator. If used, these agents typically comprise from about 0.01 % to about 3%, more preferably from about 0.01 % to about 2 % by weight of the composition.

- (g) Clay Soil Removal/Anti-redeposition Agents - The compositions of the present invention can also optionally contain water-soluble ethoxylated amines having clay soil removal and anti-redeposition properties.
- (h) Optionals - The compositions herein may comprise minor amounts of various optional ingredients, including bleach stabilizers, perfumes, preservatives, and the like. If used, such optional ingredients will typically comprise from about 0.005% to about 2%, by weight, of the compositions, having due regard for residues on carpeting.

The pH range of the pre-spotting compositions helps provide stability to the hydrogen peroxide and is typically in the acid-slightly basic range from about 3 to about 8, preferably from about 6 to about 8

Organic Solvent - The preferred cleaning (especially including spot cleaning) solvent herein is butoxy propoxy propanol (BPP) which is available in commercial quantities as a mixture of isomers in about equal amounts. The isomers, and mixtures thereof, are useful herein. The isomer structures are as follows:



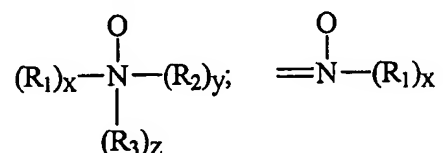
While the spot cleaning compositions herein function quite well with only the solvent, water and surfactant, they may also optionally contain other ingredients to further enhance their stability. Hydrotropes such as sodium toluene sulfonate and sodium cumene sulfonate, short-chain alcohols such as ethanol and isopropanol, and the like, can be present in the compositions. If used, such ingredients will typically comprise from about 0.05% to about 5%, by weight, of the stabilized compositions herein.

Other solvents or co-solvents which can optionally be used herein include various glycol ethers, including materials marketed under trademarks such as Carbitol, methyl Carbitol, butyl Carbitol, propyl Carbitol, and hexyl Cellosolve, and especially methoxy propoxy propanol (MPP), ethoxy propoxy propanol (EPP), propoxy propoxy propanol (PPP), and all isomers and mixtures, respectively, of MPP, EPP, and PPP, as well as butoxy propanol (BP), and the like, and mixtures thereof. If used, such solvents or co-solvents will typically comprise from about 0.5% to about 2.5%, by weight, of the aqueous compositions herein.

Surfactants - Nonionics such as the ethoxylated C<sub>10</sub>-C<sub>16</sub> alcohols, e.g., NEODOL 23-6.5, can be used in the compositions. The alkyl sulfate surfactants which may be used herein as cleaners and to stabilize aqueous compositions are the C<sub>8</sub>-C<sub>18</sub> primary ("AS"; preferred C<sub>10</sub>-C<sub>14</sub>, sodium salts), as well as branched-chain and random C<sub>10</sub>-C<sub>20</sub> alkyl sulfates, and C<sub>10</sub>-C<sub>18</sub> secondary (2,3) alkyl sulfates of the formula  $\text{CH}_3(\text{CH}_2)_x(\text{CHOSO}_3^-\text{M}^+)\text{CH}_3$  and  $\text{CH}_3(\text{CH}_2)_y(\text{CHOSO}_3^-\text{M}^+)\text{CH}_2\text{CH}_3$  where x and (y + 1) are integers of at least about 7, preferably at least about 9, and M is a water-solubilizing cation, especially sodium, as well as unsaturated sulfates such as oleyl sulfate. Alkyl ethoxy sulfate (AES) surfactants used herein are conventionally depicted as having the formula  $\text{R}(\text{EO})_x\text{SO}_3\text{Z}$ , wherein R is C<sub>10</sub>-C<sub>16</sub> alkyl, EO is -CH<sub>2</sub>CH<sub>2</sub>-O-, x is 1-10 and can include mixtures which are conventionally reported as averages, e.g., (EO)<sub>2.5</sub>, (EO)<sub>6.5</sub> and the like, and Z is a cation such as sodium ammonium or magnesium (MgAES). The C<sub>12</sub>-C<sub>16</sub> alkyl dimethyl amine oxide surfactants can also be used. A preferred mixture comprises MgAE<sub>1</sub>S/C<sub>12</sub> dimethyl amine oxide at a weight ratio of about 10:1. Other surfactants which improve phase stability and which optionally can be used herein include the polyhydroxy fatty acid amides, e.g., C<sub>12</sub>-C<sub>14</sub> N-methyl glucamide. AS stabilized compositions preferably comprise 0.1%-0.5%, by weight, of the compositions herein. MgAES and amine oxides, if used, can comprise 0.01%-2%, by weight, of the compositions. The other surfactants can be used at similar levels.

Dye Transfer Inhibiting Agents – The polyamine N-oxide polymers preferred for use herein contain units having the following structural formula:  $R-A_x-P$ ; wherein P is a polymerizable unit to which an N-O group can be attached or the N-O group can form part of the polymerizable unit or the N-O group can be attached to both units; A is one of the following structures:  $-NC(O)-$ ,  $-C(O)O-$ ,  $-S-$ ,  $-O-$ ,  $-N=$ ; x is 0 or 1; and R is aliphatic, ethoxylated aliphatics, aromatics, heterocyclic or alicyclic groups or any combination thereof to which the nitrogen of the N-O group can be attached or the N-O group is part of these groups. Preferred polyamine N-oxides are those wherein R is a heterocyclic group such as pyridine, pyrrole, imidazole, pyrrolidine, piperidine and derivatives thereof.

The N-O group can be represented by the following general structures:



wherein  $R_1$ ,  $R_2$ ,  $R_3$  are aliphatic, aromatic, heterocyclic or alicyclic groups or combinations thereof; x, y and z are 0 or 1; and the nitrogen of the N-O group can be attached or form part of any of the aforementioned groups. The amine oxide unit of the polyamine N-oxides has a  $pK_a < 10$ , preferably  $pK_a < 7$ , more preferred  $pK_a < 6$ .

Any polymer backbone can be used as long as the amine oxide polymer formed is water-soluble and has dye transfer inhibiting properties. Examples of suitable polymeric backbones are polyvinyls, polyalkylenes, polyesters, polyethers, polyamide, polyimides, polyacrylates and mixtures thereof. These polymers include random or block copolymers where one monomer type is an amine N-oxide and the other monomer type is an N-oxide. The amine N-oxide polymers typically have a ratio of amine to the amine N-oxide of 10:1 to 1:1,000,000. However, the number of amine oxide groups present in the polyamine oxide polymer can be varied by appropriate copolymerization or by an appropriate degree of N-oxidation. The polyamine oxides can be obtained in almost any degree of polymerization. Typically, the average molecular weight is within the range of 500 to 1,000,000; more preferred 1,000 to 500,000; most preferred 5,000 to 100,000.

The most preferred polyamine N-oxide useful in the detergent compositions herein is poly(4-vinylpyridine-N-oxide) which has an average molecular weight of about 50,000 and an amine to amine N-oxide ratio of about 1:4. This preferred class of materials can be referred to as "PVNO".

Copolymers of N-vinylpyrrolidone and N-vinylimidazole polymers (referred to as a class as "PVPVI") are also preferred for use herein. Preferably the PVPVI has an average molecular weight range from 5,000 to 1,000,000, more preferably from 5,000 to 200,000, and most preferably from 10,000 to 20,000. (The average molecular weight range is determined by light scattering as described in Barth, et al., Chemical Analysis, Vol 113. "Modern Methods of Polymer Characterization", the disclosures of which are incorporated herein by reference.) The PVPVI copolymers typically have a molar ratio of N-vinylimidazole to N-vinylpyrrolidone from 1:1 to 0.2:1, more preferably from 0.8:1 to 0.3:1, most preferably from 0.6:1 to 0.4:1. These copolymers can be either linear or branched.

The present invention compositions also may employ a polyvinylpyrrolidone ("PVP") having an average molecular weight of from about 5,000 to about 400,000, preferably from about 5,000 to about 200,000, and more preferably from about 5,000 to about 50,000. PVP's are known to persons skilled in the detergent field; see, for example, EP-A-262,897 and EP-A-256,696, incorporated herein by reference. Compositions containing PVP can also contain polyethylene glycol ("PEG") having an average molecular weight from about 500 to about 100,000, preferably from about 1,000 to about 10,000. Preferably, the ratio of PEG to PVP on a ppm basis delivered in wash solutions is from about 2:1 to about 50:1, and more preferably from about 3:1 to about 10:1.

Clay Soil Removal/Anti-redeposition Agents—The compositions of the present invention can also optionally contain water-soluble ethoxylated amines having clay soil removal and antiredeposition properties.

The most preferred soil release and anti-redeposition agent is ethoxylated tetraethylene-Pentamine ("TEPA"). On average tetraethylene-pentamine is ethoxy-lated with 15-18 moles of ethylene oxide at each hydrogen site. Exemplary ethoxylated amines are further described in U.S. Pat. No. 4,597,898, VanderMeer, issued Jul. 1, 1986. Another group of preferred clay soil removal-antiredeposition agents are the cationic compounds disclosed in European Patent Application 111,965, Oh and Gosselink, published Jun. 27, 1984. Other clay soil removal/anti-redeposition agents which can be used include the ethoxylated amine polymers disclosed in European Patent Application 111,984, Gosselink, published Jun. 27, 1984; the zwitterionic polymers disclosed in European Patent Application 112,592, Gosselink, published Jul. 4, 1984; and the amine oxides disclosed in U.S. Pat. No. 4,548,744, Connor, issued Oct. 22, 1985. Other clay soil removal and/or anti redeposition agents known in the art can also be utilized in the compositions herein. Another type of preferred antiredeposition agent includes the carboxy methyl cellulose (CMC) materials. These materials are well known in the art.

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Optionals - In addition to the water, the solvent, the optional hydroxide and the surfactants disclosed above, liquid compositions used herein may comprise various optional ingredients, such as perfumes, preservatives, brighteners, salts for viscosity control, pH adjusters or buffers, stabilizers including antioxidants and reductive agents as well as other compatible ingredients.

Absorbent Stain Receiver - The absorbent stain receiver which is used in the present invention includes an absorbent material which imbibes the liquid composition. In preferred modes of operation, the stain receiver is designed specifically to "wick" or "draw" the liquid compositions away from the stained area. The most preferred type of absorbent stain receiver for use herein comprises Functional Absorbent Materials ("FAM's") which are in the form of water-absorbent foams having a controlled capillary size. The physical structure and resulting high capillarity of FAM-type foams provide very effective water absorption, while at the same time the chemical composition of the FAM typically renders it highly lipophilic. Thus, the FAM can essentially provide both hydrophilicity and lipophilicity simultaneously. (FAM foams can be treated to render them hydrophilic. Both the hydrophobic or hydrophilic FAM can be used herein.)

The manufacture of FAM-type foams for use as the stain receiver herein forms no part of the present invention. The manufacture of FAM foam is very extensively described in the patent literature; see, for example: U.S. 5,260,345 to DesMarais, Stone, Thompson, Young, LaVon and Dyer, issued November 9, 1993; U.S. 5,268,224 to DesMarais, Stone, Thompson, Young, LaVon and Dyer, issued December 7, 1993; U.S. 5,147,345 to Young, LaVon and Taylor, issued September 15, 1992 and companion patent U.S. 5,318,554 issued June 7, 1994; U.S. 5,149,720 to DesMarais, Dick and Shiveley, issued September 22, 1992 and companion patents U.S. 5,198,472, issued March 30, 1993 and U.S. 5,250,576 issued October 5, 1993; U.S. 5,352,711 to DesMarais, issued October 4, 1994; PCT application 93/04115 published March 4, 1993, and U.S. 5,292,777 to DesMarais and Stone, issued March 8, 1994; U.S. 5,387,207 to Dyer, DesMarais, LaVon, Stone, Taylor and Young, issued February 7, 1995; U.S. 5,500,451 to Goldman and Scheibel, issued March 19, 1996; and U.S. 5,550,167 to DesMarais, issued August 27, 1996. The preparation of FAM foam is further described in copending application "Carpet Stain Removal Product which Uses Sonic or Ultrasonic Waves", P & G Case 7021, Hortal et al. which is hereby incorporated by reference.

Unlike other conventional absorbent mediums, a FAM stain receiver is able to convey an enhanced consumer signal of soil removal due to its unique combination of microscopic pore size and hydrophilic capillary draw forces. The capillary nature of the foam causes liquids to be

freely drawn in and redistributed evenly throughout the interstitial structure, while the tight microscopic cell structure selectively inhibits soils and particulates suspended within that liquid from permeating beyond the surface of the FAM medium.

The result is that all suspended soils extracted from the carpet become selectively concentrated at the surface of the FAM medium, where they contrast sharply against the pure white background of the FAM medium. This is in contrast to larger celled absorbent mediums (such as paper toweling) which allow broader dispersal and dilution of the suspended soils throughout their structure. The soil removal signal of these mediums becomes diluted as well.

Thus the selective concentration of soils by the FAM provides a powerful visual feedback signal of soil removal to the consumer. This feedback signal can also be utilized by the consumer to indicate completion of the stain removal process; by signalling when no additional soils are able to be removed from the carpet.

Alternatively, disposable paper towels, cloth towels such as BOUNTY™ brand towels, clean rags, etc., can be used. A preferred receiver consists of a nonwoven pad. In a preferred embodiment, the overall nonwoven is an absorbent structure composed of about 72% wood pulp and about 28% bicomponent staple fiber polyethylene-polypropylene (PE/PP). It is about 60 mils thick. It optionally, but preferably, has a barrier film on its rear surface to prevent the cleaning liquid from passing onto the surface on which the pre-spotting operation is being conducted. The receiver's structure establishes a capillary gradient from its upper, fluid receiving layer to its lower layer. The gradient is achieved by controlling the density of the overall material and by layering the components such that there is lower capillary suction in the upper layer and greater capillary suction force within the lower layer. The lower capillary suction comes from having greater synthetic staple fiber content in the upper layer (these fibers have surfaces with higher contact angles, and correspondingly lower affinity for water, than wood pulp fibers) than in the lower layer.

More particularly, the absorbent stain receiver article herein can be conveniently manufactured using procedures known in the art for manufacturing nonwoven, thermally bonded air laid structures ("TBAL"). As an overall proposition, TBAL manufacturing processes typically comprise laying-down a web of absorbent fibers, such as relatively short (4-5 mm) wood pulp fibers, in which are commingled relatively long (30-50 mm) bi-component fibers which melt slightly with the application of heat to achieve thermal bonding. The bi-component fibers intermingled throughout the wood pulp fibers thereby act to "glue" the entire mat together. Different from conventional TBAL-type structures, the disposition of the bi-component fibers in the upper and lower layers of the stain receiver herein is not uniform. Rather, the upper (fluid

receiving) layer of the fibers which comprises the stain receiver is relatively richer in bi-component fibers than in wood pulp (or other cellulosic) fibers. Since the bi-component fibers are made from synthetic polymers which are relatively hydrophobic, the upper layer of fibers in the stain receiver tends to be more hydrophobic, as compared with the lower layer of fibers which, since it contains a high proportion of wood pulp, tends to be more hydrophilic. This difference in hydrophobicity/hydrophilicity between the upper and lower fiber layers in the stain receiver helps draw water (e.g., the aqueous compositions herein) and stain materials out of the fabrics which are being treated in the manner disclosed herein.

To illustrate the foregoing in more detail, in one mode, the present stain receiver the uppermost (fluid receiving) layer (to be placed against the soiled carpeting) is about 50% bicomponent fiber and about 50% wood pulp, by weight, with a basis weight of about 50 grams/m<sup>2</sup> (gsm). The lower layer is an 80/20 (wt.) blend of wood pulp and bicomponent staple fiber with a basis weight of about 150 gsm. These ratios can be varied, as long as the upper layer is more hydrophobic than the lower layer. For example, upper layers of 60/40, 70/30, etc. bicomponent/wood can be used. Lower layers of 90/10, 65/35, 70/30, etc. wood/bicomponent can be used.

Lint Control Binder Spray - A heat crosslinkable latex binder can optionally be sprayed onto the upper layer of the stain receiver article to help control lint and to increase strength. A variety of alternative resins may be used for this purpose. Thus, the surface of the uppermost layer can be sprayed with a crosslinkable latex binder (Airflex 124, supplied by Air Products) at a concentration of about 3 to 6 grams per square meter. This binder does not have great affinity for water relative to wood pulp, and thus does not importantly affect the relative hydrophobicity of the upper layer. Cold or hot crimping, sonic bonding, heat bonding and/or stitching may also be used along all edges of the receiver to further reduce linting tendency.

Backing Sheet - When thus prepared, the bi-layer absorbent structure which comprises the stain receiver is sufficiently robust that it can be used as-is. However, in order to prevent strike-through of the liquid onto the sole of the shoes or the hands, it is preferred to affix a fluid-impermeable barrier sheet to the bottom-most surface of the lower layer. This backing sheet also improves the integrity of the overall stain receiver article. The bottom-most surface of the lower layer can be extrusion coated with an 0.5-2.0 mil, preferably 0.75 mil, layer of PE or PP film using conventional procedures. The film layer is designed to be a pinhole-free barrier to prevent any undesired leakage of the liquid composition beyond the receiver. This backing sheet can be printed with usage instructions, embossed and/or decorated, according to the desires of the formulator.



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**Basis weight** - This can vary depending on the amount of cleaning/ refreshment solution provided/anticipated to be absorbed. The preferred stain receiver structure exhibits a horizontal absorbency of about 4-15 grams of water for every gram of nonwoven. A typical 90 mm x 140 mm receiver absorbs about 10-20 grams of water. Since very little fluid is used in the typical stain removal process, much less capacity is actually required. A practical range is therefore about 10 g. to about 50 g.

**Size** - The size of the preferred receiver is about 90 mm by 140 mm, but other sizes can be used. The shape can be varied.

**Fibers** - Conveniently available 2-3 denier (0.0075-0.021 mm) polyethylene/polypropylene PE/PP bicomponent staple and standard wood pulp (hammermilled) fibers are used in constructing the preferred receiver. Other common staple fibers such as polyester, acrylic, nylon, and bicomponents of these can be employed as the synthetic component. Again, capillary suction requirements need to be considered when selecting these fibers and their sizes or deniers. Larger denier detracts from capillary suction as does surface hydrophobicity. The absorbent wood pulp fiber can also be substituted with cotton, hemp, rayon, and others. If desired, the lower layer can also comprise the so-called "supersorber" absorbent gelling materials (AGM) which are known for use in the diaper and catamenial arts. Such AGM's can comprise 1% to 20%, by weight, of the lower layer.

**Thickness** - The overall thickness (measured unrestrained) of the stain receiver is about 60 mils, but can be varied widely. The low end may be limited by the desire to provide absorbency impression. 25 mils to 200 mils (0.6 mm-5.1 mm) is a reasonable range.

**Capillary suction/density** - The overall density of the stain receiver affects both absorbency rate and fluid capacity. Typical wood pulp containing absorbent articles have a density (measured unrestrained) that ranges around 0.12-0.15 g/cc +/- 0.05. The preferred bi-layer stain receiver herein also has a density in the same range, but can be adjusted outside this range. Higher density increases stiffness; lower density decreases overall strength and makes linting more probable. The capillary suction is determined by the type of fibers, the size of the fibers, and the density of the structure. Fabrics come in many varieties, and will exhibit a large range of capillary suction, themselves. It is desirable to construct a receiver that has a greater surface capillary suction than that of the stained carpet being treated.

**Colors** - White is the preferred color, as it will best show stains as they are being removed from the fabrics being treated. However, there is no other functional limit to the color.

**Embossing** - The preferred stain receiver structure is embossable with any desired pattern or logo.

Optional Nonwoven (NW) types - While the TBAL stain receiver structure is preferred to permit density control, good thickness perception, good absorbency, and good resiliency, other types of NWs that can reasonably be used are hydroentangled, carded thermal, calendar-bonded, and other good wipe substrate-making processes (including thermal bonded wet-laid, and others).

Manufacture - The manufacture of the preferred bi-layer stain receiver is conducted using conventional TBAL processes. In one mode, the lower wood fiber-rich layer is first laid-down and the upper, synthetic fiber-rich layer is laid-down on top of it. The optional binder spray is applied to the upper layer at any convenient time. The resulting bi-layer structure is collected in rolls (which compacts the overall structure somewhat). Overall, the bi-layer structure (unrestrained) has a thickness of about 60 mils and a density of about 0.13-0.15 g/cc. This density may vary slightly, depending on the usage rates of the binder spray. The optional backing sheet is applied by passing the structure in sheet form through nip-rollers, together with a sheet of the backing film. Again, conventional procedures are used. If desired, and as a cost savings, the relative thicknesses of the lower and upper layers can be varied. Thus, since wood pulp is less expensive than bi-component fibers, the manufacturer may decide to lay down a relatively thicker lower layer, and a relatively thinner upper layer. Thus, rather than a structure whose upper/lower layer thickness ratio is about 1:1, one can select ranges of 0.2:1, 0.3:1, 0.5:1, and the like. If more absorbency is required, the ratios can be reversed. Such considerations are within the discretion of the manufacturer.

The bi-layer stain receiver is intended to be made so inexpensively that it can be discarded after a single use. However, the structures are sufficiently robust that multiple re-uses are possible. In any event, the user should position the article such that "clean" areas are positioned under the stained areas of the carpet being treated in order to avoid release of old stains from the stain receiver back onto the carpet.

The following Examples further illustrate the present invention, but are not intended to be limiting thereof.

#### EXAMPLE

A liquid cleaning composition for use herein with a FAM absorbent stain receiver and a mechanical agitation tool. The composition is used in the manner disclosed herein to spot-clean carpeting.

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TABLE A

<u>INGREDIENT</u>	<u>Composition (%)</u>
Sodium N-Lauroyl Sarcosinate	3.0
tetraethylenepentaminethyleneoxide	0.1
Poly Vinyl Pyridine-N-Oxide (PVNO)	0.4
Denaturated Ethanol	3.0
Butylated Hydroxy Toluene (BHT)	0.01
diethylenetriaminepenta (methylenephosphonic acid)	0.2
Perfume	0.1
Salicylic Acid	0.5
Sodium Hydroxide	0.12
Hydrogen Peroxide	4.0
Water (deionized or distilled)	88.57

Another example of a preferred, high water content, low residue spot cleaning composition for use in the manner disclosed herein to spot-clean carpeting.

TABLE B

<u>INGREDIENT</u>	<u>Composition (%)</u>
Hydrogen peroxide	1.000
Amino tris(methylene phosphonic acid)*	0.04
Butoxypropoxypropanol (BPP)	2.000
NH <sub>4</sub> Coconut EO <sub>1</sub> Sulfate	0.285
Dodecyldimethylamine oxide	0.031
Magnesium chloride	0.018
Magnesium sulfate	0.019
Hydrotrope, perfume, other minors,	0.1
Kathon preservative	0.0003
Water (deionized or distilled)	96.507
Target pH	6.0

\* Stabilizer for hydrogen peroxide

The liquid composition is applied to the stain on the carpet, after which the hand-held cleaning tool is used to impart mechanical agitation to the stain for about 30 seconds. Thereafter, a FAM foam stain receiver is applied to the wet, treated stain. The stain is wicked or otherwise

sucked into the FAM foam stain receiver leaving the previously stained textile substantially with its original appearance.

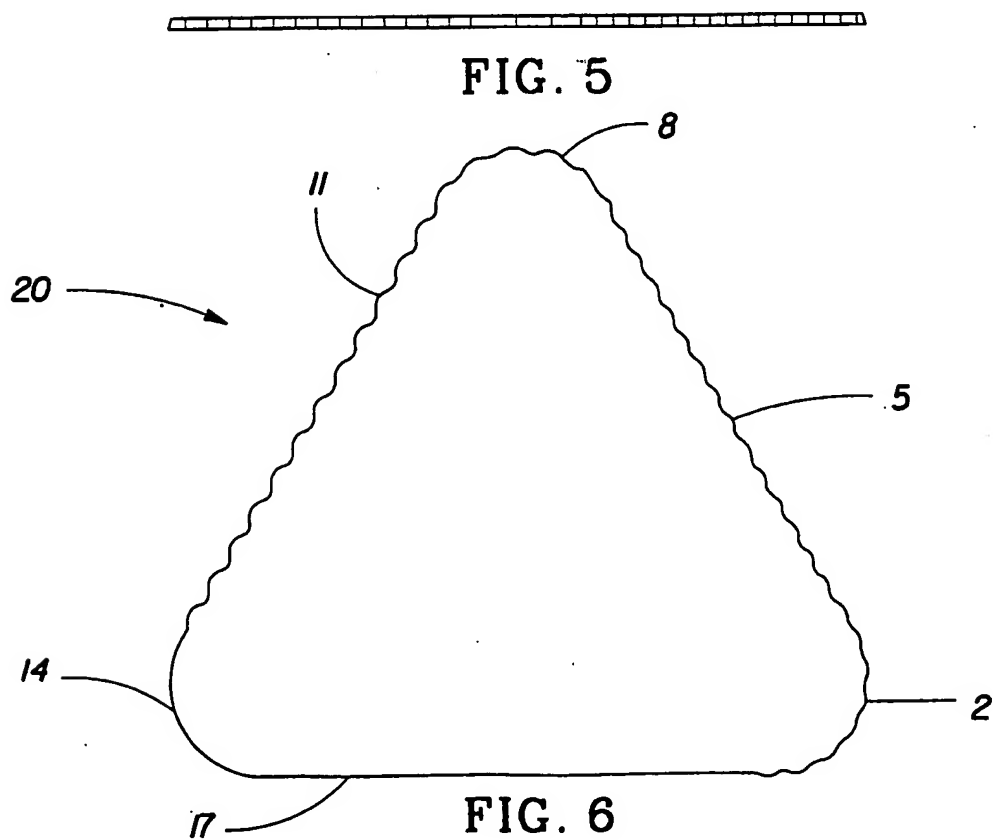
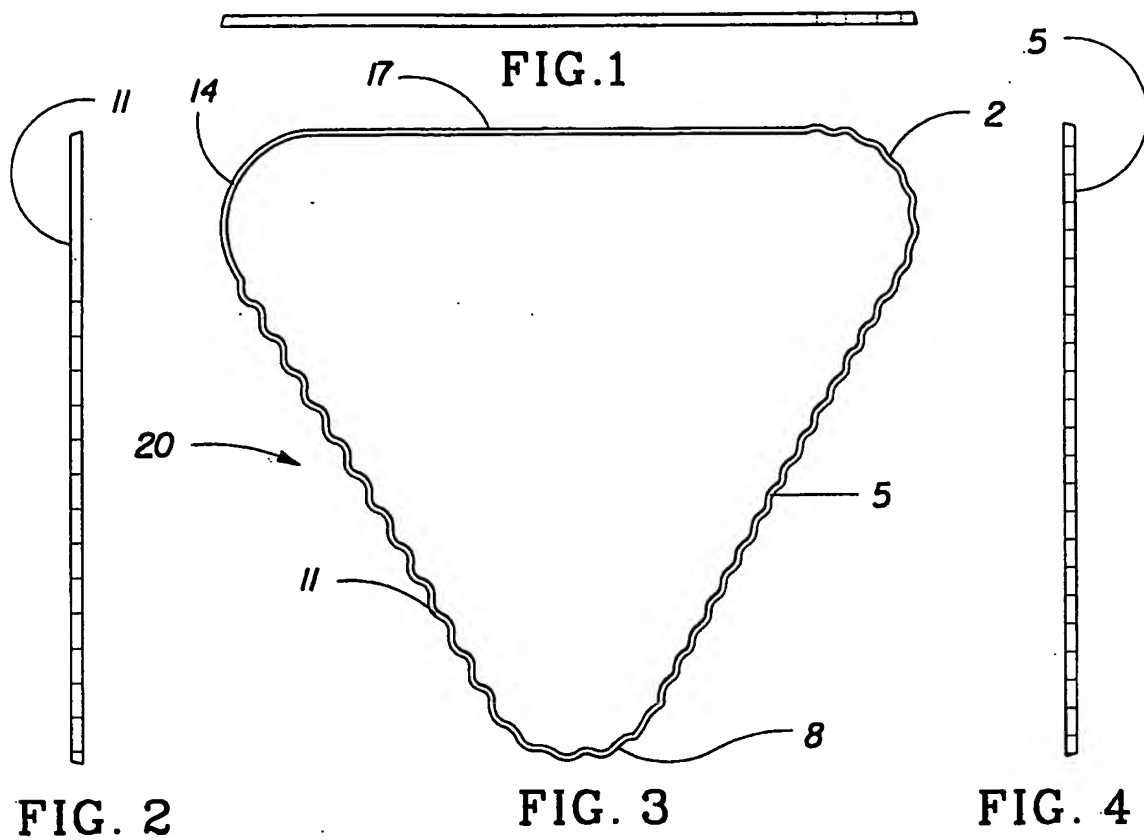
Alternatively, the visible signal provided by the FAM stain receiver can be used to indicate to a user how much stain is being removed. In this embodiment of the process, the user performs the process as described above. However, after applying the FAM foam stain receiver to the wet treated stain, the consumer evaluates the stage of completeness of the cleaning process by looking at the strong visible signal provided by the FAM stain receiver of how much stain particulates are being removed. To do this, the user examines the FAM stain receiver to see the amount and nature of the liquid matter trapped on the surface of the FAM receiver. If an examination indicates that the FAM receiver is continuing to draw up the solution of the cleaning composition and soil and stain particles then the user may wish to continue applying additional cleaning composition and mechanical agitation to the stained area on the carpet. The user may repeat these iterations as many times as desirable until an examination of the FAM stain receiver indicates that little solution is being drawn up into the FAM material, indicating that the carpet is close to being in a dry, clean state.

**What is claimed is:**

1. A kit characterized by:
  - (a) a liquid cleaning composition including water, an organic solvent and a surfactant;  
and
  - (b) a hand-held tool for imparting mechanical agitation onto stains on carpet fibers, wherein the hand-held tool is of a substantially triangular shape, having a first straight edge, a second straight edge and a third straight edge, and a first rounded corner, a second rounded corner and a third rounded corner; the first and second straight edges and the first and second rounded corners being serrated and provided with a multiplicity of projecting ridges.
2. The kit of claim 1 wherein the organic solvent is selected from the group characterized by butoxy propoxy propanol, ethanol and mixtures thereof.
3. The kit of any of claims 1-2 wherein the kit further is characterized by instructions for using the liquid cleaning composition and the hand-held tool, the instructions being enclosed with or on a container enclosing the kit, wherein the instructions comprise:
  - (i) applying an effective amount of the liquid cleaning composition to a stain;  
and
  - (ii) imparting mechanical agitation to the stain using the hand-held tool.
4. The kit of any of claims 1-3 wherein the kit further is characterized by an absorbent stain receiver comprised of an absorbent material, the absorbent stain receiver preferably being a Functional Absorbent Material in the form of a foam adapted for using capillary suction to absorb the stain.
5. The kit of any of claims 1-4 wherein the absorbent material is selected from the group consisting of comminuted wood pulp, creped cellulose wadding, hydrogel-forming polymer gelling agents, creped tissues, creped nonwovens containing fibers comprised of absorbent polymers, modified cross-linked cellulose fibers, capillary channel fibers, absorbent foams, thermally bonded airlaid materials, absorbent sponges, synthetic staple fibers, polymeric fibers, peat moss and combinations thereof.

6. The kit of any of claims 1-5 wherein the liquid cleaning composition is characterized by:
  - (i) from 0.1% to 10% by weight of an organic solvent;
  - (ii) from 0.25% to 7% by weight of hydrogen peroxide;
  - (iii) from 0.01% to 3% by weight of a peroxide-stabilizing amount of a chelating agent;
  - (iv) from 0.05% to 3.5% by weight of a deterative surfactant; and
7. A process characterized by the steps of:
  - (i) applying an effective amount of a liquid cleaning composition to a stain on carpet fibers; and
  - (ii) imparting mechanical agitation to the stain using a hand-held tool, wherein the hand-held tool is of a substantially triangular shape, having a first straight edge, a second straight edge and a third straight edge, and a first rounded corner, a second rounded corner and a third rounded corner; the first and second straight edges and the first and second rounded corners are serrated, being provided with a multiplicity of projecting ridges wherein, optionally, the steps are performed simultaneously.
8. The process of any of claims 1-7 wherein the liquid cleaning composition is characterized by water, an organic solvent and a surfactant.
9. The process of any of claims 1-8 wherein the process is characterized by an additional step of contacting an absorbent stain receiver with the stain while applying pressure so as to absorb the stain into the absorbent material of the absorbent stain receiver.
10. An article of manufacture characterized by a hand-held tool for imparting mechanical agitation onto stains on carpet fibers, wherein the hand-held tool is of a substantially triangular shape, having a first straight edge, a second straight edge and a third straight edge, and a first rounded corner, a second rounded corner and a third rounded corner; the first and second straight edges and the first and second rounded corners are serrated, being provided with a multiplicity of projecting ridges.

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2/3

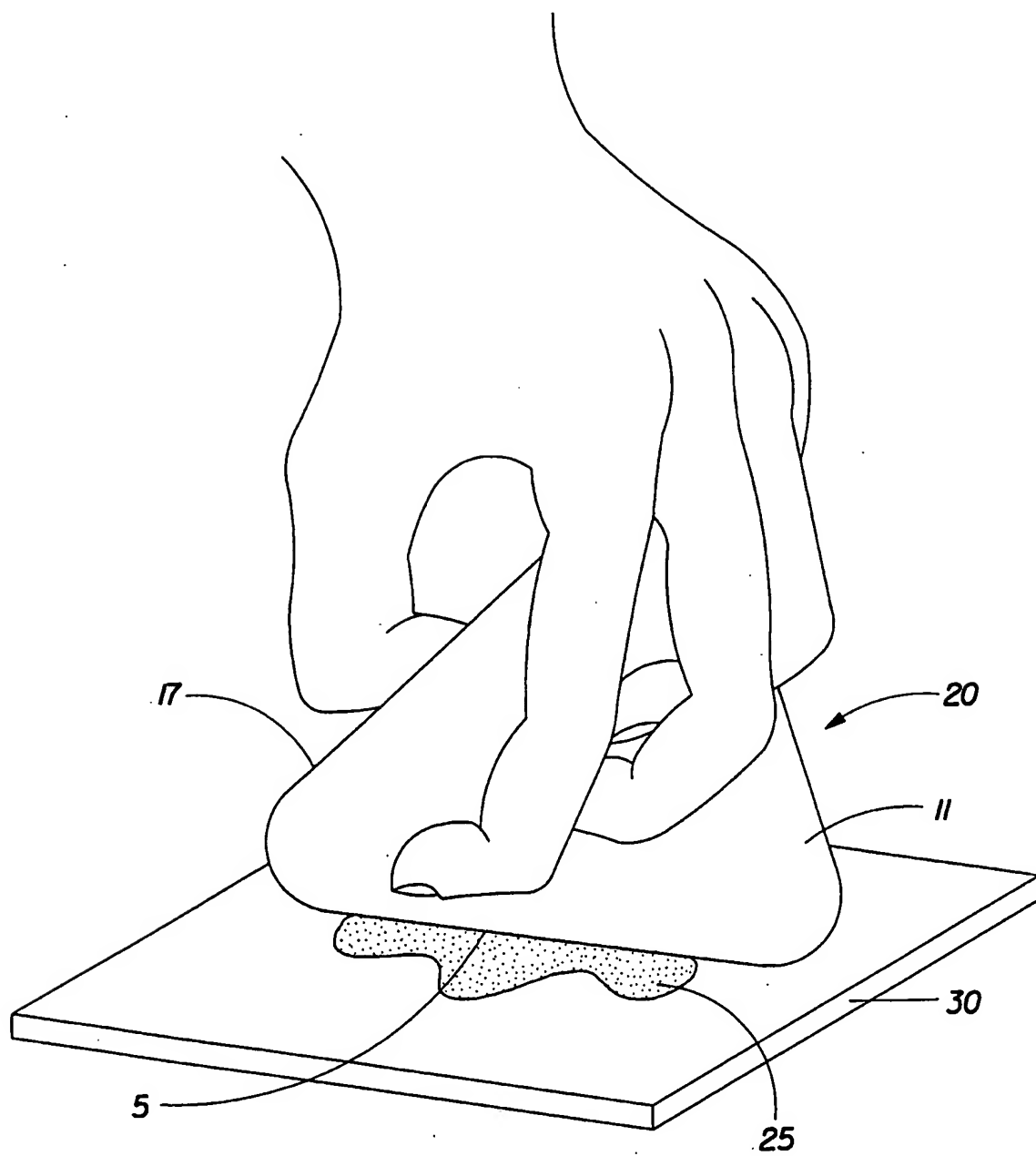


FIG. 7



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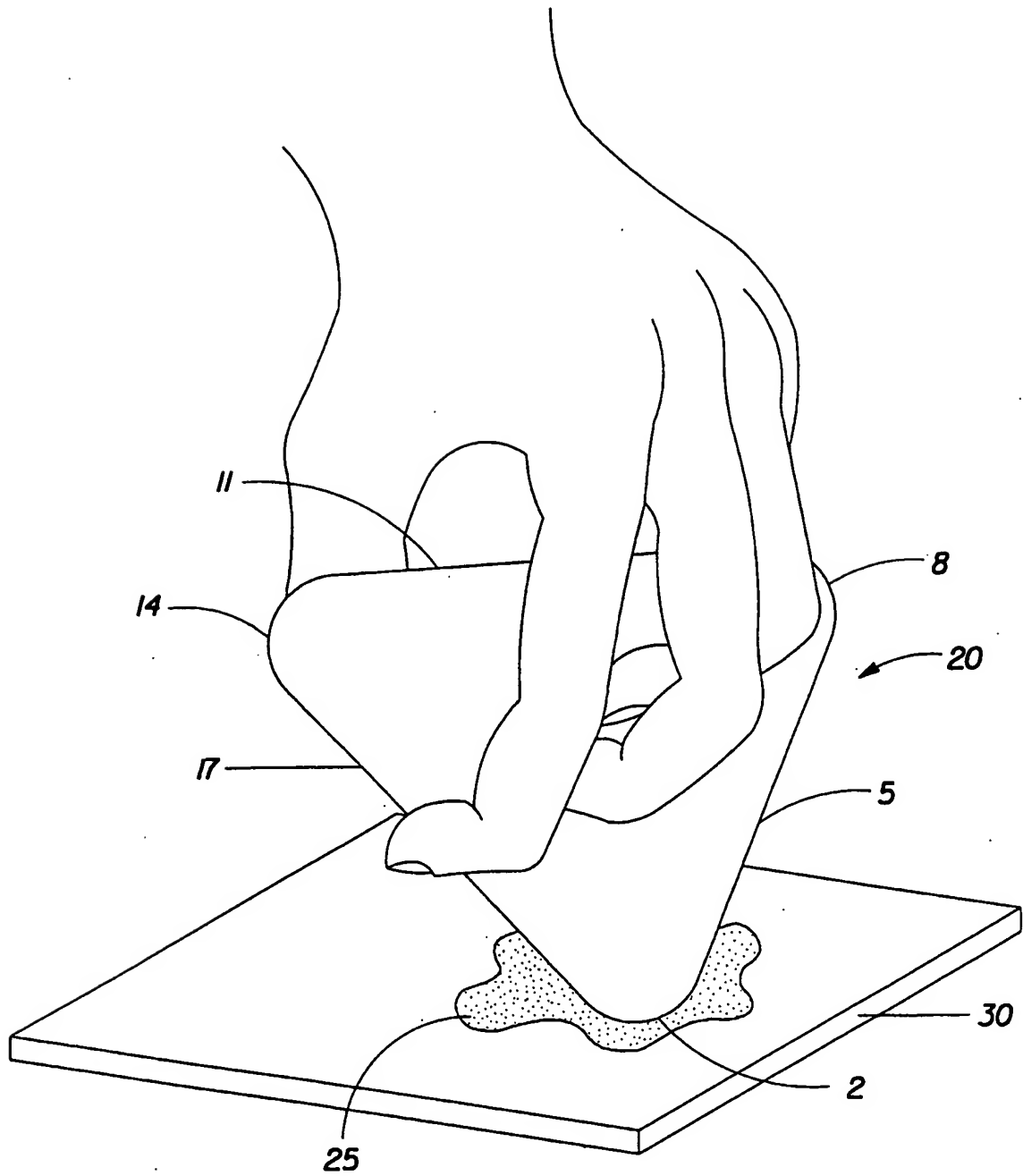


FIG. 8

## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/US 99/25942

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 C11D3/00 A47L13/02 A47L25/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C11D A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, A	WO 99 42555 A (PROCTER & GAMBLE) 26 August 1999 (1999-08-26) claims 1-3, 12, 15, 16; figure 1	1-10
A	WO 98 17771 A (PROCTER & GAMBLE) 30 April 1998 (1998-04-30) claims 1-16; figures 1, 3, 4	1-16

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"Z" document member of the same patent family

Date of the actual completion of the international search

18 January 2000

Date of mailing of the international search report

15/03/2000

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# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/US 99/25942

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9942555 A	26-08-1999	NONE	
WO 9817771 A	30-04-1998	US 5872090 A BR 9712669 A EP 0937129 A	16-02-1999 19-10-1999 25-08-1999